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News Media Contact: (202) 586-4940
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Department of Energy Awards $156 Million for Groundbreaking Energy Research Projects

New ARPA-E Projects in 25 States Will Accelerate Innovation in Clean Energy Technologies, Increase America's Competitiveness and Create Jobs

Washington, D.C. – Arun Majumdar, Director of the Department of Energy's Advanced Research Projects Agency-Energy (ARPA-E), today announced 60 cutting-edge research projects aimed at dramatically improving how the U.S. produces and uses energy. With $156 million from the Fiscal Year 2011 budget, the new ARPA-E selections focus on accelerating innovations in clean technology while increasing America's competitiveness in rare earth alternatives and breakthroughs in biofuels, thermal storage, grid controls, and solar power electronics. Demonstrating the success ARPA-E has already seen, the program announced this year that eleven of its projects secured more than $200 million in outside private capital investment.

"These innovative projects are at the forefront of a new technological frontier that plays a critical role in our future energy security and economic growth, "said Majumdar. "It is now more important than ever to invest in game-changing ideas that will build the technological infrastructure for a new, clean energy economy."

The projects selected are located in 25 states, with 50% of projects led by universities, 23% by small businesses, 12% by large businesses, 13% by national labs, and 2% by non-profits. Prior to today, ARPA-E has awarded $365.7 million in funds to approximately 120 groundbreaking energy projects within seven program areas. This most recent round of selections brings the total to 180 projects, 12 program areas and $521.7 million in awards at ARPA-E to date.

Summaries of the new programs and an example project from each are below. Information on all projects announced today is available HERE.

PETRO: Plants Engineered To Replace Oil ($36 million)
ARPA-E funds breakthrough technologies that optimize the biochemical processes of energy capture and conversion to develop robust, farm-ready crops that deliver more energy per acre with less processing prior to the pump. If successful, PETRO will create biofuels from domestic sources such as tobacco and pine trees for half their current cost, making them cost-competitive with fuels from oil.

- **Example PETRO Project: University of Florida – Gainesville, Florida ($6.3 million).**

The University of Florida project will increase the production of turpentine, a natural liquid biofuel isolated from pine trees. The pine tree developed for this project is designed both to increase the turpentine storage capacity of the wood and to increase turpentine production from 3% to 20%. The fuel produced from these trees would become a sustainable domestic biofuel source able to produce 100 million gallons of fuel per year from less than 25,000 acres of forestland.

REACT: Rare Earth Alternatives in Critical Technologies ($31.6 million)

Rare earths are naturally-occurring minerals with unique magnetic properties that are used in many existing and emerging energy technologies. Rising rare earth prices have already escalated costs for some energy technologies and may jeopardize the availability and widespread adoption of many critical energy solutions by U.S. manufacturers. ARPA-E funds early-stage technology alternatives that reduce or eliminate the dependence on rare earth materials by developing substitutes in two key areas: electric vehicle motors and wind generators.

- **Example REACT Project: Pacific Northwest National Lab "Manganese-Based Permanent Magnet" – Richland, Washington ($2.3 million).** PNNL's team will reduce the cost of wind turbines and electric vehicles by developing a replacement for rare earth magnets based on an innovative composite using manganese material. Manganese composites could potentially achieve twice the strength of the magnets used today, while using inexpensive and abundant raw materials. The team will develop stronger magnets by leveraging high-performance supercomputer modeling and high-speed experiments of various metal composite formulations that do not contain rare earths. If developed successfully, these composite magnets will reduce the U.S. dependence on expensive rare-earth material imports, and reduce the cost and improve efficiency of green technologies.

HEATS: High Energy Advanced Thermal Storage ($37.3 million)

More than 90% of energy technologies involve the transport and conversion of thermal energy. Therefore, advancements in thermal energy storage – both hot and cold – would dramatically improve performance for a variety of critical energy applications. ARPA-E will develop revolutionary cost-effective thermal energy storage technologies.

- **Example HEATS Project: Massachusetts Institute of Technology "HybriSol" – Cambridge, Massachusetts ($2.9 million).** Using innovative nanomaterials, MIT will develop a thermal energy storage device, or a heat battery, that captures and stores energy from the sun to be released onto the grid at a later time. This energy storage device called 'HybriSol' is transportable like fuels, 100% renewable, rechargeable like a battery and emissions-free. In addition, 'Hybrisol' can be used without a grid infrastructure for applications such as heating and water purification. If successful, this heat battery could have an unprecedented impact on efforts to decrease fossil fuel consumption and emissions, enabling clean solar energy to be accessible 24 hours a day.

GENI: Green Electricity Network Integration ($36.4 million)

ARPA-E funds innovative control software and high-voltage hardware to reliably control the grid network, specifically: 1) cost-optimizing controls able to manage

sporadically available sources, such as wind and solar, alongside coal and nuclear, and 2) resilient power flow control hardware – or the energy equivalent of an internet router – to enable automated, real-time control of grid components. If successful, these technologies will enable utilities and operators to optimally control the flow of power; making the grid more secure, resilient, reliable, and could potentially save billions of dollars every year.

- **Example GENI Project: Texas Engineering Experiment Station – College Station, Texas ($4.9 million).** Historically the electric grid was designed to be passive causing electric power to flow along the path of least resistance. The Texas Engineering Experiment Station team will develop a new system that allows real-time, automated control over the transmission lines that make up the electric power grid. This new system would create a more robust, reliable electric grid, and reduce the risk of future blackouts, potentially saving billions of dollars a year.

Solar ADEPT: Solar Agile Delivery of Electrical Power Technology ($14.7 million)

The SunShot Initiative leverages the unique strengths across DOE to reduce the total cost of utility-scale solar systems by 75 percent by the end of the decade. If successful, this would enable solar electricity to scale without subsidies and make the U.S. globally competitive in solar technology. ARPA-E's portion of the collaboration is the Solar ADEPT program, which focuses on integrating advanced power electronics into solar panels and solar farms to extract and deliver energy more efficiently. This program could reduce power conversion costs by up to 50 percent for utilities and 80 percent for homeowners.

- **Example Solar ADEPT Project: Ideal Power Converters – Austin, Texas ($2.5 million).** Ideal Power Converters is developing light-weight electronics to connect photovoltaic solar panels to the grid. Their technology explores innovative circuits using revolutionary transistor designs to develop solar panel electronics for commercial-scale buildings that are compact enough to be installed on walls or roof-tops. The project goal is to reduce the weight of these electronics by 98%, reducing the cost of materials, manufacturing, shipping and installation, supporting the aggressive cost-reduction goals of the Department of Energy's SunShot Initiative.

To learn more about ARPA-E and previous awards, visit arpa-e.energy.gov.

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